

Request for Information: Antenna Elements for Volumetric Interferometry

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Description

This is a Request for Information (RFI) by the Defense Advanced Research Projects Agency (DARPA) on ideas for developing compact radio-frequency receiver antennas for application in arrays that provides wideband spectral coverage and an instantaneous field-of-view (FOV) that is near hemispherical or greater.

The target application for this antenna/s is in arrays that allows for wide FOV volumetric interferometry. Interferometry is based on the measurement of radio frequency (RF) electrical phase differential between individual antenna elements within an array of antenna elements. The typical implementation of this technology is a linear array of antenna elements with a limited FOV. A much larger array FOV (hemispherical, azimuth 360 degrees, elevation -5 to + 90 degrees) may be enabled via volumetric interferometry, which is a relatively new concept involving application of interferometric principles to two dimensional sparse array geometries. The array geometries associated with volumetric interferometry are non-linear where the antenna elements may populate a planar surface. Volumetric interferometry is predicated on the measurement of the RF electrical phase differences between individual antenna elements within an array. In view of this, to support the intended application, it is imperative that each antenna element have a well behaved phase response as a function of RF signal angle of arrival (AOA). Target antenna to antenna phase tracking errors should be less than 10 degrees rms over the entire FOV.

The frequency range of interest is from microwave through millimeter-waves (2-100 GHz with 3:1 or more sub-bands). It is anticipated that no single antenna element could cover such instantaneous bandwidth. Therefore a sub-band paradigm may be applied. The goal is to show a 3:1 or greater instantaneous RF bandwidth.

The RF signals of interest could be of any common polarization. Thus the subject antenna element should be able to accommodate multiple polarizations. Polarizations of interest are right hand circular (RHC), left hand circular (LHC), linear horizontal (LH) and linear vertical (LV). Support for LH and LV is a minimum requirement. LHC may be omitted

if inclusion is not technically feasible. As with the electrical phase response, polarization response as a function of AOA should also be very well behaved. Polarization measurement is not required.

It is further envisaged that the subject antenna will be employed in applications where the antenna's physical dimensions needs to be constrained to less than 150 cm³ at 6 GHz and above and to 450 cm³ at 2 GHZ. This is necessary in order to minimize array antenna element FOV blockages and to support weight sensitive system integrations. Each antenna should have a minimum gain of -10 dB over entire FOV.

DARPA solicits respondents to submit ideas related to this topic for use by the Government in formulating a potential program. DARPA requests that submittals briefly and clearly describe the potential approach or concept, outline critical technical issues, and comment on the expected performance, robustness, affordability, weight, size and power requirements of the proposed approach. The Government does not intend to award a contract on the basis of this RFI or to otherwise pay for the information solicited, nor is the Government obligated to issue a solicitation based on responses received. Responses should be limited to three pages for any given concept. Any proprietary concepts or information should be clearly identified as such. Input on technical aspects of the responses may be solicited by DARPA from non-Government consultants/experts who are bound by appropriate non-disclosure requirements. For all RFI responses, an additional, non-proprietary cover page is also requested identifying your company name, technical point of contact and contact information. In order to comply with scheduling priorities, responders are asked to provide feedback by no later than close of business (COB) June 20, 2008. RFI Responses should be submitted in a commonly used electronic format and may be e-mailed or mailed on a CD-ROM to: Dr. Ronald Esman, Program Manager, DARPA/MTO, 3701 N Fairfax Dr. Arlington, VA 22203. E-mail: ronald.esman@darpa.mil Phone (571) 218-4691, Fax (703) 248-1817.